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IS 11436 (1985): General requirements for ground handling and transport systems equipment for air cargo unit load devices [TED 14: Aircraft and Space Vehicles]

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“Knowledge is such a treasure which cannot be stolen”



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Indian Standard

GENERAL REQUIREMENTS FOR GROUND HANDLING AND TRANSPORT SYSTEMS EQUIPMENT FOR AIR CARGO UNIT LOAD DEVICES

1. Scope — Specifies minimum performance and compatibility requirements for ground handling and transport systems equipment for air cargo unit load devices (ULD) used to service civil wide body freight aircraft.

1.2 This standard is applicable to ground handling and transport systems equipment, designed to deal with main deck unitized cargo in the form of intermodal containers and compatible unitized load devices. In the context of this standard, intermodality concerns, primarily, air and land modes, but does not exclude sea mode. Likewise, compatible equipment, other than that used for main deck cargo is not excluded.

2. Equipment

2.0 General

2.0.1 An air cargo ULD ground handling and transport system, in addition to ULD's is considered as including a loading system or loader and ground transport equipment.

2.0.2 For the purpose of this standard, the loading device or loader is that equipment, reposition the ULD's ready for loading and load the ULD's onto the main cargo deck of the aircraft. The loader is also used during unloading operations to remove ULD's from the aircraft main cargo deck and reposition them onto the ground transport equipment. Facility docking equipment can be considered as performing the loader function.

2.0.3 The ground handling system shall be completely compatible and integrated with the aircraft and the facility environmental features. For example, environmental features associated with the system are aircraft door opening sizes and locations, cargo envelopes, clearances, cargo movement paths, sill heights, air craft stabilization characteristics, height limitations for working under the aircraft, noise control, turning radius and driver visibility.

2.1 Unit Load Devices (ULD)

2.1.1 The specification for unit load device shall be in accordance with IS : 7917 (Part 1)-1975 'Specification for air cargo freight container: Part 1 General requirements', IS : 7074 (Part 1)-1973 'Specification for air cargo pallets: Part 1 General requirements' and IS : 7074 (Part 2)-1978 'Specification for air cargo pallets: Part 2 Testing'.

2.1.2 Air cargo ULD chassis shall be designed to meet the minimum applicable national and international regulations, when designed for operation on public highways.

2.1.3 Cargo which exceeds the dimensions as laid down in **2.1**, but which is within the maximum aircraft size and load carrying capabilities shall be considered. For that purpose, particular consideration shall be given to the following characteristics:

- a) Any part of the handling or loading equipment, protruding beyond the conveyor plane, which might interfere with an overhanging load within the maximum aircraft envelope, shall be retractable or removable; and
- b) Compatibility shall be ensured with any additional equipment which might be necessary to handle overweight or oversize pieces of cargo.

2.2 Ground Transport Equipment

2.2.0 The ground transport equipment provides the carriage and support structure for the unit load devices during ground movements. This equipment shall also incorporate the necessary

restraint devices to secure the ULD to the chassis during ground movements. This equipment shall meet the following minimum requirements.

2.2.1 Types — Air cargo ULD chassis shall be of the following types:

- a) Type 1, nominal 12·2 m (40 ft) air cargo containers chassis, suitable for moving one 12·2 m (40 ft) air cargo container or pallet, or two 6·1 m (20 ft) containers or pallets;
- b) Type 2, nominal 6·1 m (20 ft) air cargo container chassis suitable for moving one 6·1m (20 ft) air cargo container or pallet; and
- c) Type 3, ULD chassis, suitable for moving one 12·2 m (40 ft) or one 6·1 m (20 ft) air cargo container or pallet, as well as mixed loads of 6·1 m (20 ft) or 3·05 m (10 ft) air cargo container or pallets and other ULDs.

2.2.2 Chassis — Air cargo ULD chassis shall be of the following classes:

- a) Class A, transporters with conveyorized decks, capable of transporting ULDs as well as interfacing with conveyorized loading systems; and
- b) Class B, skeletal transporter chassis, designed for use with lifting equipment for transfer of ULDs on to conveyorized airport equipment.

2.2.3 Dimensional criteria — Air cargo container chassis shall be designed to have a laden and unladen deck (or toll plane) height from 1 220 to 1 575 mm. Chassis width shall be such that, when loaded with ULDs located at the extremes of lateral tolerances, the overall width is less than or equal to the maximum allowable local or national regulation, when designed for operation on public highways (see Fig. 1).

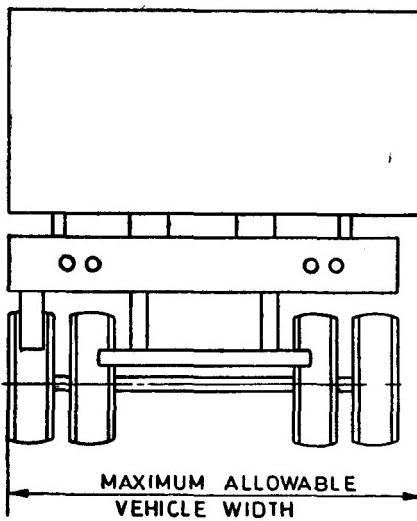


FIG. 1 LATERAL POSITIONING TOLERANCE

2.2.4 Environment — Equipment shall be capable of operation under the environment conditions specified in IS : 10494-1983 'General requirement for air cargo loading equipment'.

2.2.5 Operation — Equipment shall be such that one man without tools of any kind, is able to operate it. The operation of the equipment shall not require the operator to leave ground level.

2.2.6 Restraints — Type 3 chassis shall be capable of restraining the various upper deck size ULDs of wide body aircraft, which the equipment is designed to transport, in random mixes, up to the full bed length of the chassis.

2.2.7 Power loading — Powered class A equipment shall include a self-contained powered loading system for loading and unloading ULDs which meets the following criteria:

- a) Driveway disconnect umbilical connection for electrical power;
- b) Conveyor deck design shall permit manual movement of ULDs and shall therefore include an adequate walk area, consisting of a non-slip surface;

- c) The mechanical efficiency of the conveyor systems shall be equal to or in excess of 97 percent; and
- d) Manual overside shall be achieved by the operator, without the use of tools and within the time period of 1 minute.

2.2.8 Manual loading — Non powered equipment shall require minimum effort to operate as designated in 2.2.7(c).

2.3 Aircraft Loader Equipment — The aircraft loader equipment shall be designed to meet as many as possible of the alignment and interface requirements for the exchange of ULDs between aircraft and ground transport equipment in order to minimize the complexity, hence cost, of the considerable amount of equipment used in this system (see 3.2 and 3.4).

2.3.1 The specifications shall be in accordance with IS : 10515-1983 'General requirements of main deck container/pallet loader for aircraft'.

2.3.2 Loader types

- a) Type A, direct interchange of ULDs between aircraft and chassis. (This might be fixed facility or moveable equipment.)
- b) Type B, loader transporter. In addition to aircraft interchange, the loader transports ULDs to a site other than that of the parked aircraft for loading on or off ground transport equipment.

2.3.3 Environment — Aircraft loader system shall be capable of operation under the environment conditions specified in IS : 10494-1983 'General requirements for air cargo loading equipment'.

2.3.4 Terminal lifters — The ground transport system family of equipment may include unit load device lifting equipment which would permit transfer of ULDs from skeletal class B transporter chassis onto class A conveyorized transporters, capable of interfacing with the loaded system.

3. Interface Requirements

3.1 ULD to Chassis

3.1.1 Restraints-general — The restraint system shall meet or exceed the requirement of applicable national and international regulations for operations on public highways.

3.1.2 Restraints for Type 1 and 2 chassis — Air cargo unit load devices of the 6'1 m (20 ft) and 12'2 m (40 ft) lengths shall be restrained to Type 1 and 2 chassis by one of the following means:

- a) Bottom corner fittings shall be in accordance with IS : 7694-1975 'Dimensions and general requirements of corner fittings for ISO series freight containers' or IS : 7917 (Part 1)-1975 (Type B pallets only).
- b) End slots shall be in accordance with IS : 7917 (Part 1)-1975 (Type A and B pallets).

3.1.3 Restraint for Type 3 chassis — Unit load devices of 3'05 m (10 ft), 6'1 m (20 ft) and 12'2 m (40 ft) lengths shall be restrained to Type 3 chassis by one of the following means:

- a) Bottom corner fittings shall be in accordance with IS : 7694-1975 or IS : 7917 (Part 1)-1975 (Type B pallets only); and
- b) End slots shall be in accordance with IS : 7917 (Part 1)-1975 (Type A and B pallets).

3.1.4 Support — Air cargo unit load devices of the 3'05 m (10 ft), 6'1 m (20 ft) and 12'2 m (40 ft) lengths shall either be fully supported on the base, as in the case of a conveyorized deck, or rest on structural supports only when bottom corner fittings are the support means. Clearance between the base and any other chassis non-supporting member shall be ensured under all conditions. Bottom corner fittings support pad areas shall be consistent with the corner fitting area.

3.1.5 Guides — The chassis shall incorporate suitable guides to ensure smooth continuous transfer of containers. These guides may be retractable in order to conform with 2.1.3(a) and/or 2.2.3.

3.2 Chassis to Loader System

3.2.1 Alignment — The loader system shall include, if required, provision for such vertical and horizontal alignment of the bed to ensure smooth continuous transfer of ULDs between the vehicles.

3.2.1.1 The loader system shall provide any necessary accommodation to the chassis to negate any suspension, tyre or structural deflections of the chassis which might be detrimental to the exchange of ULDs between these two units.

3.2.2 Docking positions — The minimum possible ULD transfer attitudes shall be:

- between either side of Type A or B loaders and either side of Type 1 or 2, Class B chassis;
- between the aft end of Type A or B loaders and the aft end of Type 1 or 2, Class A chassis; and
- between either side or the aft end of Type A or B loaders and the aft end of Type 3, Class A chassis (see Fig. 2 and Table 1) other options may be possible.

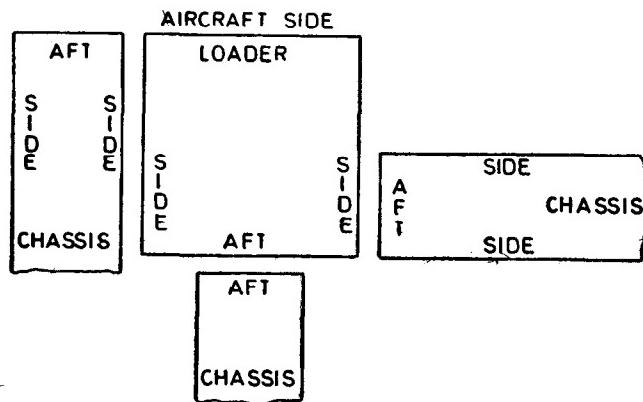


FIG. 2 TRANSFER ATTITUDES

TABLE 1 MINIMUM TRANSFER ATTITUDES (X) (OTHER OPTIONS MAY BE POSSIBLE)

ULD Transfers	Chassis					
	Type 1		Type 2		Type 3	
	Class		Class		Class	
	A	B	A	B		A
Between either side of loader (Type A or B) and either side of chassis		X*			X*	
Between aft end of loader (Type A or B) and either side of chassis						
Between either side of loader (Type A or B) and aft end of chassis						X
Between aft end of loader (Type A or B) and aft end of chassis	X		X			

*Lifting required.

3.2.2.1 The chassis design shall provide the necessary clearance to allow 'pick up' or 'deposit' of containers onto the chassis with a lifting device.

3.2.3 Height — The recommended loader transfer elevations for interfacing with transporter equipment shall be 1 370 mm with an acceptable range of 1 220 to 1 575 mm. In specific instances, compatibility with 508 mm high systems may be necessary (see Fig. 3).

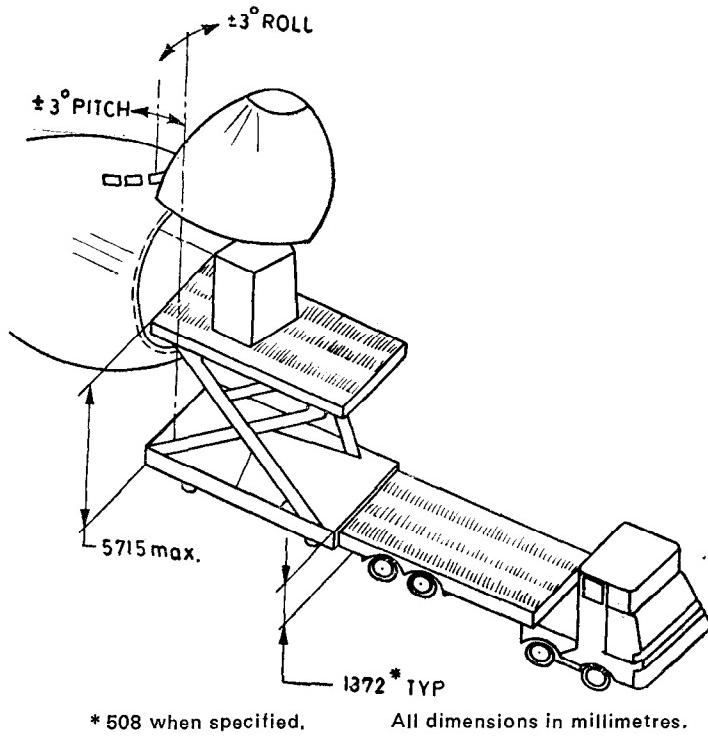


FIG. 3 LOADER INTERFACES (AIRCRAFT FRONT DOOR SHOWN-SIDE DOOR SIMILAR)

3.2.4 Spacing — The distance between the outermost support of the transporter and the loader shall be consistent with IS : 11437-1985 'Ground equipment requirements for compatibility with aircraft unit load devices'. In order to help guard against equipment docking damage, the spacing shall be at the maximum allowable distance between these support elements.

3.2.4.1 In order to control the spacing at this interface and to prevent equipment damage, an accessory stop assembly on the loader shall be used.

3.3 ULD to Loader System

3.3.1 The loader system shall provide all the necessary power and mechanism to transfer ULDs between the chassis and aircrafts.

3.3.2 All contacts surfaces, such as guide rails, restraints and drive mechanisms, shall be compatible with each container or ULD type specified in 2.1.

3.3.3 Contact surfaces intended for smaller ULDs, and which interface with transit of larger ULDs, shall retract with a minimum of force and present minimum resistance to continued transit.

3.3.4 There shall be no parts of the loader which can damage the ULDs.

3.3.5 The loader system shall incorporate suitable guides to ensure smooth and continuous transfer of ULDs.

3.3.6 The loader shall be capable of transferring ULDs in any powered direction at a rate of at least 0.3 m/s.

3.4 Loader System to Aircraft

3.4.1 Alignment — The upper and lower limits of the lift system shall be such as to always provide a smooth, continuous transfer of ULDs, even during extreme airplane attitudes and poor

ramp or climatic conditions (*see Fig. 3*). Positive indication shall be provided to determine whether the loader is properly aligned at the aircraft interface.

3.4.1.1 Preferred system maximum height shall be 5 715 mm with infinitely variable interface positioning.

3.4.1.2 Roll attitude adjustment range shall be $\pm 3^\circ$.

3.4.1.3 Pitch attitude adjustment range shall be $\pm 3^\circ$.

3.4.1.4 It shall not be a facility requirement to position and tether the nose of the aircraft during loading/unloading of unitized cargo.

3.4.2 ULD transfer— The loader shall provide for the alignment to the ULD to the aircraft loading system and power it onto the aircraft.

3.4.2.1 The loader design shall consider multidirectional ULD movement across the interface and minimize resultant scuffing.

4. System Performance

4.1 The total air cargo ULD ground handling and transport system shall be designed to meet minimum aircraft turnaround cycles consistent with those aircraft which it is intended to serve.

5. Reliability, Maintainability, Safety, Materials and Workmanship

5.1 System equipment shall meet the requirement of IS : 10494-1983.

E X P L A N A T O R Y N O T E

The aim of this standard is to lay down minimum requirements for the handling and restraint of unit load device (ULD) to ensure interchangeability.

This standard is based on ISO/DIS 7715 'Air cargo — ground handling and transport systems for unit load devices — minimum requirements', issued by the International Organization for Standardization (ISO).